

WHAT IS CLAIMED IS:

1. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film comprising;

(a) a first layer, a second polymer layer, a third polymer layer, and a fourth polymer layer;

(b) wherein said first polymer layer comprises a first ethylene/ α -olefin copolymer having an α -olefin comprising 4-8 pendant carbon atoms, wherein said first ethylene/ α -olefin copolymer has:

(i) a melting point of less than 105° C. as measured in accordance with ASTM D-3418;

(ii) a molecular weight distribution M_w/M_n of from 0.05- 2.7 as measured in accordance with ASTM D-3593-80;

(iii) a melt index of from 6.5-34 g/10 min. at 190° C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg;

(b) wherein said first ethylene α -olefin copolymer is present in said first layer is an amount of from 50-100%, based on the total weight of said first layer;

(c) wherein said second layer comprises a second ethylene/ α -olefin copolymer having a melt index of from 0.85-6.0 g/10 min as measured in accordance with ASTM D-1238, Condition 190° C./2.16 kg;

(d) wherein A is the cumulative total weight percentage of said first ethylene/ α -olefin copolymer in all layers of said film and B is the cumulative total weight percentage of said second ethylene/ α -olefin copolymer in all layers of said film, said weight percentages being based on the total film weight, such that the relative amounts A and B satisfy the relationship $2A/B \leq 1$; and

(e) wherein said packaging film has an unrestrained linear thermal shrinkage in the machine direction or the transverse direction of between 20-100% at 85° C. as measured in accordance with ASTM D-2732-96.

2. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said first layer is a heat-sealable outer-surface layer.

3. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said film has a total thickness less than 10 mils.

4. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 3; wherein said film has a total thickness less than 5 mils.

5. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said third layer is an oxygen barrier layer or a non-oxygen barrier layer.

6. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 5; wherein said oxygen barrier layer comprises a material selected from the group consisting of ethylene/vinyl alcohol copolymer, polyvinyl chloride, polyvinylidene chloride, polyamide, polyacrylonitrile, copolymers of vinylidene chloride and vinyl chloride or alkyl acrylate, and a blend thereof.

7. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 5; wherein said non-oxygen barrier layer is selected from the group consisting of ionomer, ethylene/ α -olefin copolymer, ethylene/vinyl acetate copolymer, anhydride-modified ethylene/vinyl acetate copolymer, ethylene/methyl acrylate copolymer, ethylene/ethyl acrylate copolymer, anhydride-modified ethylene/ α -olefin copolymer, anhydride-modified polyolefin and blends thereof.

8. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 7; wherein said ethylene/ α -olefin copolymer has a melt index of from 0.85-6.0 g/10 min. at 190°C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg.

9. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; further comprising a fifth layer.

10. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; further comprising a sixth layer.

11. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; further comprising a seventh layer.

12. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of less than 5% as measured in accordance with ASTM D 2765-01.

13. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said film is irradiated to a level such that at least one layer

of said film has a gel content of not less than 5% as measured in accordance with ASTM D 2765-01.

14. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 13; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of not less than 10% as measured in accordance with ASTM D 2765-01.

15. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 14; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of not less than 20% as measured in accordance with ASTM D 2765-01.

16. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 1; wherein said film forms a package.

17. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film comprising:

(a) a first layer, a second polymer layer, a third polymer layer, a fourth polymer layer, and a fifth polymer layer;

(b) wherein said first polymer layer is a heat-sealable outer-surface layer and comprises a first ethylene/ α -olefin copolymer having an α -olefin comprising 4-8 pendant carbon atoms, wherein said first ethylene/ α -olefin copolymer has:

(i) a melting point of less than 105° C. as measured in accordance with ASTM D-3418;

(ii) a molecular weight distribution M_w/M_n of from 0.05- 2.7 as measured in accordance with ASTM D-3593-80;

(iii) a melt index of from 6.5-34 g/10 min. at 190° C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg;

(c) wherein said second layer comprises a second ethylene/ α -olefin copolymer having a melt index of from 0.85-6.0 g/10 min as measured in accordance with ASTM D-1238, Condition 190° C./2.16 kg;

(d) wherein A is the cumulative total weight percentage of said first ethylene/ α -olefin copolymer in all layers of said film and B is the cumulative total weight percentage of said second ethylene/ α -olefin copolymer in all layers of said film, said weight

percentages being based on the total film weight, such that the relative amounts A and B satisfy the relationship $2A/B \leq 1$; and

(e) wherein said packaging film has an unrestrained linear thermal shrinkage in the machine direction or the transverse direction of between 20-100% at 85° C. as measured in accordance with ASTM D-2732-96.

18. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; wherein said film has a total thickness less than 10 mils.

19. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; wherein said third layer is an oxygen barrier layer or a non-oxygen barrier layer.

20. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 19; wherein said oxygen barrier layer comprises a material selected from the group consisting of ethylene/vinyl alcohol copolymer, polyvinyl chloride, polyvinylidene chloride, polyamide, polyacrylonitrile, copolymers of vinylidene chloride and vinyl chloride or alkyl acrylate, and a blend thereof.

21. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 19; wherein said non-oxygen barrier layer is selected from the group consisting of ionomer, ethylene/ α -olefin copolymer, ethylene/vinyl acetate copolymer, anhydride-modified ethylene/vinyl acetate copolymer, ethylene/methyl acrylate copolymer, ethylene/ethyl acrylate copolymer anhydride-modified ethylene/ α -olefin copolymer, anhydride-modified polyolefin and blends thereof.

22. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 21; wherein said ethylene/ α -olefin copolymer has a melt index of from 0.85-6.0 g/10 min. at 190°C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg.

23. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; further comprising a sixth layer.

24. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; further comprising a seventh layer.

25. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; wherein said film is irradiated to a level such that at least one layer

of said film has a gel content of less than 5% as measured in accordance with ASTM D 2765-01.

26. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of not less than 5% as measured in accordance with ASTM D 2765-01.

27. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 26; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of not less than 10% as measured in accordance with ASTM D 2765-01.

28. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 17; wherein said film forms a package.

29. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film comprising:

(a) a first layer, a second polymer layer, a third polymer layer, a fourth polymer layer, a fifth polymer layer, sixth polymer layer, and a seventh polymer layer;

(b) wherein said first polymer layer is a heat-sealable outer-surface layer and comprises a first ethylene/ α -olefin copolymer having an α -olefin comprising 4-8 pendant carbon atoms, wherein said first ethylene/ α -olefin copolymer has:

(i) a melting point of less than 105° C. as measured in accordance with ASTM D-3418;

(ii) a molecular weight distribution M_w/M_n of from 0.05- 2.7 as measured in accordance with ASTM D-3593-80;

(iii) a melt index of from 6.5-34 g/10 min. at 190° C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg;

(c) wherein said second layer comprises a second ethylene/ α -olefin copolymer having a melt index of from 0.85-6.0 g/10 min as measured in accordance with ASTM D-1238, Condition 190° C./2.16 kg;

(d) wherein A is the cumulative total weight percentage of said first ethylene/ α -olefin copolymer in all layers of said film and B is the cumulative total weight percentage of said second ethylene/ α -olefin copolymer in all layers of said film, said weight

percentages being based on the total film weight, such that the relative amounts A and B satisfy the relationship $2A/B \leq 1$; and

(e) wherein said packaging film has an unrestrained linear thermal shrinkage in the machine direction or the transverse direction of between 20-100% at 85° C. as measured in accordance with ASTM D-2732-96.

30. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said film has a total thickness less than 5 mils.

31. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said third polymer layer, said polymer fifth layer, said sixth polymer layer, and said seventh polymer layer each comprise at least one material selected from the group consisting of ionomer, ethylene/ α -olefin copolymer, ethylene/vinyl acetate copolymer, anhydride-modified ethylene/vinyl acetate copolymer, ethylene/methyl acrylate copolymer, ethylene/ethyl acrylate copolymer anhydride-modified ethylene/ α -olefin copolymer, anhydride-modified polyolefin and blends thereof.

32. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said ethylene/ α -olefin copolymer has a melt index of from 0.85-6.0 g/10 min. at 190°C. as measured in accordance with ASTM D-1238 Condition 190° C./2.16 kg.

33. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said fourth layer is an oxygen barrier layer selected from the group consisting of ethylene/vinyl alcohol copolymer, polyvinyl chloride, polyvinylidene chloride, polyamide, polyacrylonitrile, copolymers of vinylidene chloride and vinyl chloride or alkyl acrylate, and a blend thereof.

34. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of less than 5% as measured in accordance with ASTM D 2765-01.

35. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said film is irradiated to a level such that at least one layer of said film has a gel content of not less than 20% as measured in accordance with ASTM D 2765-01.

36. A coextruded heat-shrinkable, biaxially-oriented multilayered packaging film according to Claim 29; wherein said film forms a package.